

**Institute of Economic Analysis**

**How warming is made.**

**The case of Russia.**

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### **1. Introduction**

Specialists have long doubted the quality of assessment of the dynamics of global temperature in 1850-2009 as used in the documents of the Intergovernmental Panel on Climate Change (IPCC). However, in the absence of information about the original temperature values it was difficult to perform an independent check of this dynamics. The numerous raw data requests of the representatives of the climatological community to the holders of the world's largest databases of climate data have either remained unattended or only partially satisfied. In the correspondence between employees of the University of East Anglia (CRU) one of the researchers involved in the calculations of the temperature series, claimed that he "would prefer to destroy the database rather than give it to third-party professionals" who would be willing to verify his calculations in accordance with the British FOI act.

In response to the increasing public pressure, 8 December 2009 the Climate Research Unit of the University of East Anglia (CRU) in collaboration with the Meteorological Office Hadley Centre (Met Office Hadley Centre) placed some part of the database used by the joint team of the two centers (HadCRUT) to calculate Earth's surface temperature in the public domain  
<http://www.metoffice.gov.uk/corporate/pressoffice/2009/pr20091208a.html>

In the accompanying note the authors emphasize that these published data are not a new set of data, but a representative part of the database that was used in the IPCC reports to estimate the global temperature anomalies for more than 150 years.

Despite data from only 1500 surface weather stations out of the total of more than 5000 stations used in global temperature circulations eventually saw the light of the day, the authors insist that the sample is representative. According to their claims, these 1500 stations are evenly distributed over the surface of the Earth, so that the analysis made for this sample produces similar results regarding the changes of global temperature since 1850 as the analysis of the complete database. Data for other stations, the authors promise, will be made public after the relevant permissions from their owners are obtained, which primarily concerns the national meteorological services.

\* \* \*

Our task has been to find out to what extent the results of calculations of temperature series in the data released by HadCRUT (these had been used for calculations of global temperature) for weather stations located on the territory Russia coincide with the results of calculations of the temperature series for our country if all the data for Russian weather stations available in the public domain are used. Reproducibility of the obtained results would convincingly prove that the existing doubts regarding the validity of global temperature calculations produced by HadCRUT, are groundless.

## **2. Sources of data**

The first difficulty that arises concerns the format of data presentation by the Hadley Centre. This format appeared to differ very substantially from the conventional standards of presenting large data sets in this field. Instead of there being a single text file containing all data, the temperature monthly averages for each station are placed in separate files. These files are arranged by clusters corresponding to the numbering of the World Meteorological Organization (WMO). Due to the unconventional data layout those willing to calculate the temperature series on their own would have first to invest a sizable amount of efforts into creation of a holistic data array suitable for analysis.

The original measurements on which the HadCRUT based their analysis are held by the national meteorological services. In Russia, this information is provided by the public agency “All-Russian Research Institute of Hydrometeorological Information – The World Data Center” (PA “ARRIHI-WDC”).

It belongs to the Federal Service for Hydrometeorology and Environmental Monitoring (Rosgidromet). Currently the open access database maintained by PA “ARRIHI-WDC” comprises temperature data for 476 surface weather stations in Russia until 2006 [http://meteo.ru/climate/sp\\_clim.php](http://meteo.ru/climate/sp_clim.php).

Of the approximately 1500 weather stations for which data were published by the Hadley Centre, 121 stations are located on the territory of Russia. They make up about 8,1% of the total number of stations for which data are published, and 2,4% of the total number of stations used to calculate the global temperature. As far as the accompanying note says that the data on the remaining approximately 3500 stations remain unpublished for the reason of pending permissions from national authorities, one can deduce from that that when these remaining data are released, there will be no additional data from Russian weather stations among them.

In other words, to calculate the global land temperature the Hadley Centre has used the data for only a quarter (121 out of 476) of the Russian stations. To use the Russian data, the Hadley Centre either did not need permission from the Russian authorities or such permission had been already granted.

The territory of Russia constitutes about 12,5% of the Earth’s land area. Consequently, there should have been some particularly good reason for which HadCRUT preferred to use the data only for Russia's 121 stations, which represent only 2.4% of the total number of stations used to calculate global temperature, and did not to use the data for at least another 355 stations available in Russia (7,1% of the total number of stations), to elevate the representation of the Russian territory in global temperature calculations up to at least 9,5% (476 Russian stations among the 5000 stations in the global sample).

### **3. Criteria for selection of weather stations in the sample for the calculation**

Depending on the circumstances there can be cases when, instead of using all available information, it is plausible to confine the analysis to a narrower data sample. However, obviously, in such a case, the condition that this sample is representative of the original data must be rigorously observed. In the case of calculating the long-term temperature series such criteria should, in our view, comprise at least the following requirements:

- uniform distribution of weather stations over the territory;
- maximum duration period of meteorological observations;

- maximum completeness (minimum discontinuity) of the temperature series;
- constancy of location of weather stations (minimum number and minimum distance of their translocations);
- maximum mitigation of the effect of "urban and industrial warming "(the maximum distance from major urban weather stations and industrial centers).

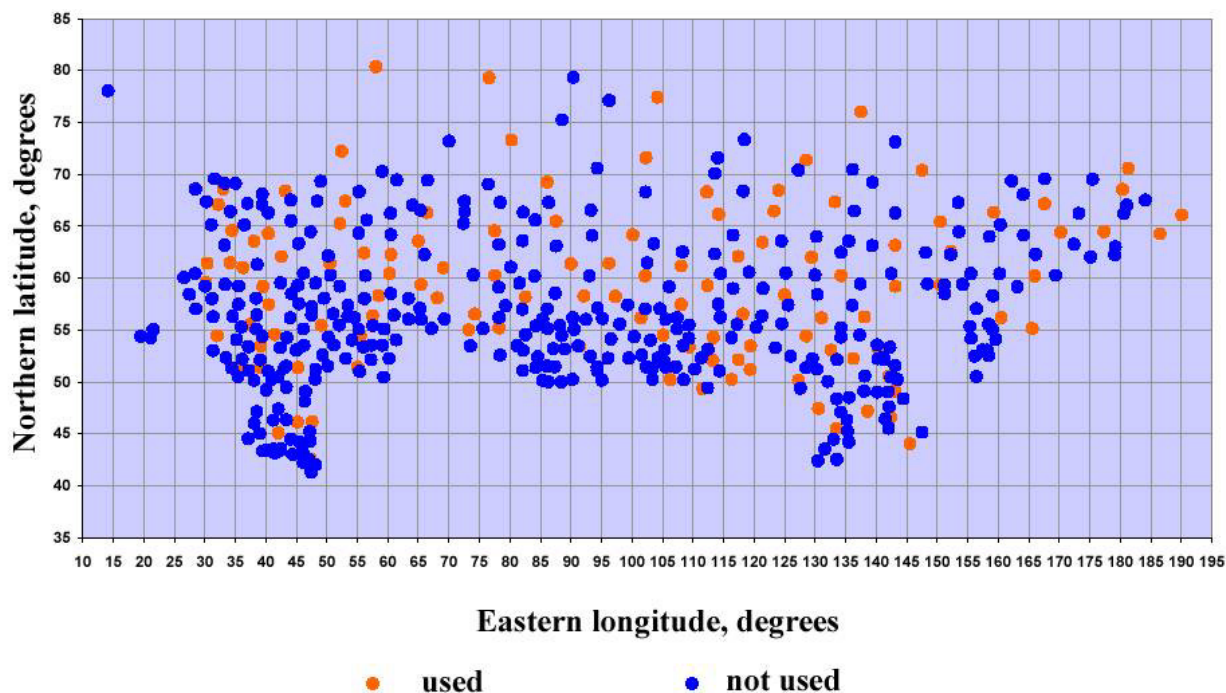
If these criteria are met, one can assume that the result obtained from the analysis of the narrower sample of data will be consistent with the requirements to an *unbiased estimate*, i.e., it will have the same characteristics, including trends and anomalies, that would be deduced from the calculations of the complete dataset, and that it will exceed the former in quality due to reduction of the impact of non-climatic factors.

#### **4. The uniformity of distribution of selected weather stations across the country**

To calculate the global and regional temperatures in the climatology and meteorology one traditionally uses a grid of cells with the geographic coordinates of 5 degrees in latitude versus 5 degrees of longitude (5° x 5°). When there is a variable density of weather stations in the cells, one averages the temperature values for weather stations within each of the cells, and then calculates the weighted temperature averages based on the area of the territory for which the temperature value is calculated. Earth's land surface lies within approximately 1500 cells of the grid.

A general idea of the location of both all the Russian weather stations, as well as of those used in the HadCRUT calculations, within such a world grid is given by scheme 1.

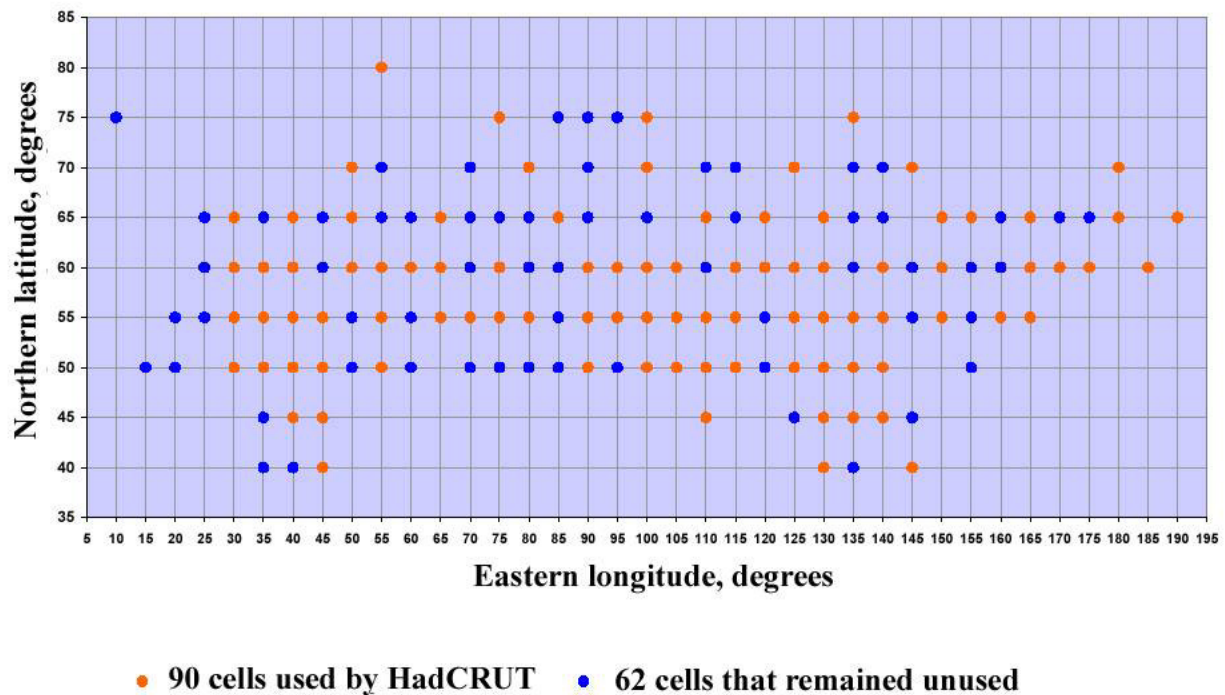
#### **Scheme 1. The geographical coordinates of Russian weather stations used and not used in the HadCRUT calculations.**



It is easy to see that the location of weather stations on the territory of Russia is not completely uniform. Their density is significantly and predictably higher in the western and southern parts of the country, while in the north and east parts it is notably lower. Nevertheless, it should be noted that in total the meteorological measurements on the territory of Russia pertain 152 grid cells. In other words, the existing Russian meteorological network in Russia provides a good opportunity to for the observations to describe the vast majority of the country's territory. If all Russian grid cells with weather stations were included into the global temperature calculations, the Russian share of global data would constitute approximately 10% (152 cells in the 1500 cells of the world grid). However, it turns out that this is not so.

Scheme 2 shows the five degrees (5° x 5°) corresponding to the territory of Russia, where it is indicated which grid cells with weather stations were used in the HadCRUT calculations which were not used.

**Scheme 2. Location of Russian weather stations used and not used by the HadCRUT on the 5° x 5° cell grid.**



Note: The presence of weather stations in the cell is denoted by a circle in the lower left corner of the cell, yellow marked cells were used by the HadCRUT, the blue marked cells are those that remained unused.

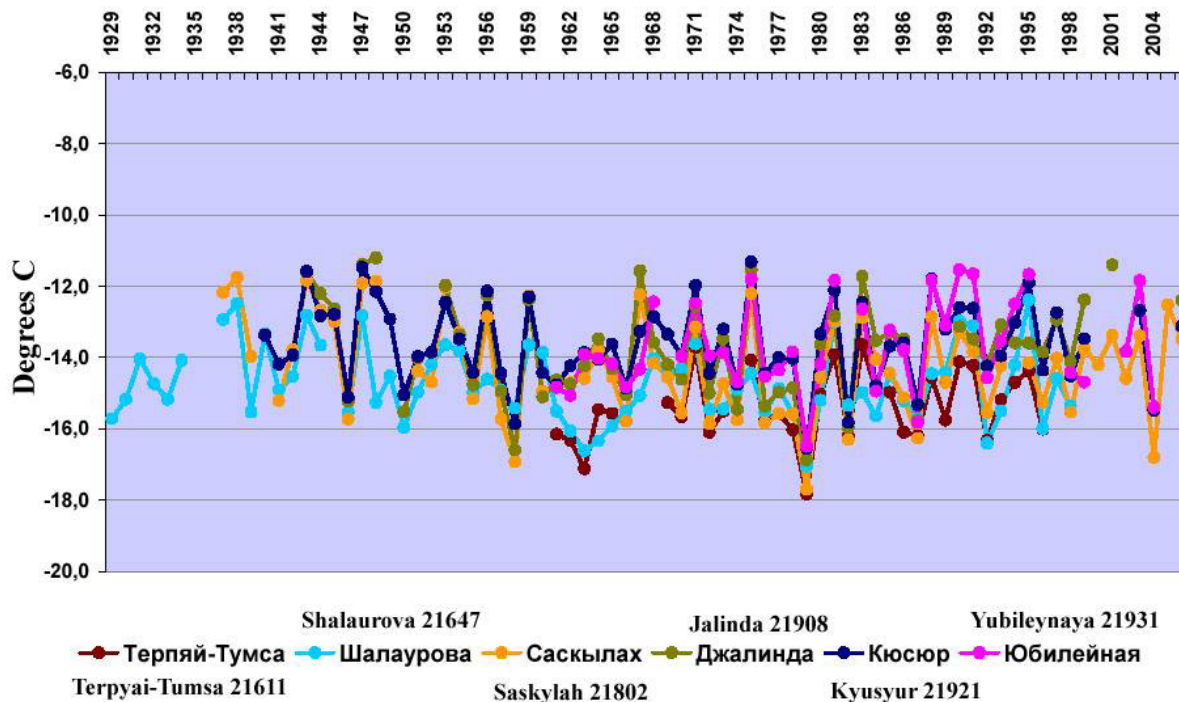
Analysis of scheme 2 shows that in their calculations the HadCRUT specialists did not use the data from a large number of cells on the territory of our country, where the weather stations are present and the relevant meteorological data are accessible not only to a narrow circle of professionals, but belong to the public domain. Furthermore, some unused cells are adjacent to each other and form largest areas (3-4 neighboring cells) along the parallels and meridians.

In other words, while it is technically possible to calculate the global and regional temperatures using data from 152 grid cells on the territory of Russia, the Hadley Centre, in their calculations, used only the data from 90 cells (or 59,2% of the total). It turns out that about 40% of the country's area was not included in the calculation not because of a lack of weather stations or observations on this territory, but for some other reason.

Theoretically it is possible that the omission of some observations, for example, in the European part of Russia bordering with other countries (9 cells), can be explained by the possibility of a wide choice of quality data from the nearby stations in the neighboring countries. However, this explanation is not valid for weather stations that are located in the country's interior.

Practically each stations located, for example, north of 70 parallel is a unique source of data for its cell grid. However, the Hadley Centre calculations used only 10 out of 23 such stations, while data from 13 stations were not used.

**Figure 1. Temperature series for some stations, located north to 70 N, not included in the HadCRUT calculations.**



Even a brief glance at the series of temperatures at the stations not included in the calculations of British experts catches attention by the lack of a clearly pronounced warming, so well known from many publications of the Hadley Centre, CRU, and the IPCC.

The HadCRUT sample has left unaccounted vast areas of Russia with coordinates 50-55 degrees north latitude and 70-90 degrees east longitude. This immense territory is home to 16 active weather stations, none of which was included in the calculations of the foreign climatologists. Another vast territory adjacent to this one, which stretches over one and a half thousand kilometers with coordinates 85 -- 90 degrees east longitude and 50-65 degrees north latitude. Not a single weather station there located was included in the sample of the Hadley Centre either.

Information on the meteorological stations used in the HadCRUT sample is presented in Table 1.



Table 1. Distribution of Russian weather stations regarding their use in the HadCRUT calculations.

Coordinates of station location, degrees	Number of weather stations			Share of stations used in the total number, %
	Total	Used by HadCRUT	Not used	
Northern latitude				
40–45	24	3	21	12,5%
45–50	36	9	27	25,0%
50–55	132	25	107	18,9%
55–60	117	26	91	22,2%
60–65	79	30	49	38,0%
65–70	65	18	47	27,7%
70–75	15	6	9	40,0%
75–80	7	3	4	42,9%
80–85	1	1	0	100,0%
<b>Total</b>	<b>476</b>	<b>121</b>	<b>355</b>	<b>25,4%</b>
Eastern longitude				
10–15	1	0	1	0,0%
15–20	1	0	1	0,0%
20–25	2	0	2	0,0%
25–30	5	0	5	0,0%
30–35	21	7	14	33,3%
35–40	32	7	25	21,9%
40–45	31	6	25	19,4%
45–50	32	5	27	15,6%
50–55	17	4	13	23,5%
55–60	21	6	15	28,6%
60–65	12	2	10	16,7%
65–70	12	5	7	41,7%
70–75	8	2	6	25,0%
75–80	12	4	8	33,3%
80–85	16	2	14	12,5%
85–90	18	2	16	11,1%
90–95	17	3	14	17,6%
95–100	10	2	8	20,0%
100–105	18	6	12	33,3%
105–110	18	5	13	27,8%
110–115	17	6	11	35,3%
115–120	13	6	7	46,2%
120–125	9	3	6	33,3%
125–130	13	5	8	38,5%
130–135	21	7	14	33,3%
135–140	18	4	14	22,2%
140–145	23	6	17	26,1%
145–150	5	2	3	40,0%
150–155	9	3	6	33,3%
155–160	16	1	15	6,3%
160–165	7	1	6	14,3%

165–170	6	3	3	50,0%
170–175	3	1	2	33,3%
175–180	5	1	4	20,0%
180–185	5	2	3	40,0%
185–190	1	1	0	100,0%
190–195	1	1	0	100,0%
<b>Total</b>	<b>476</b>	<b>121</b>	<b>355</b>	<b>25,4%</b>

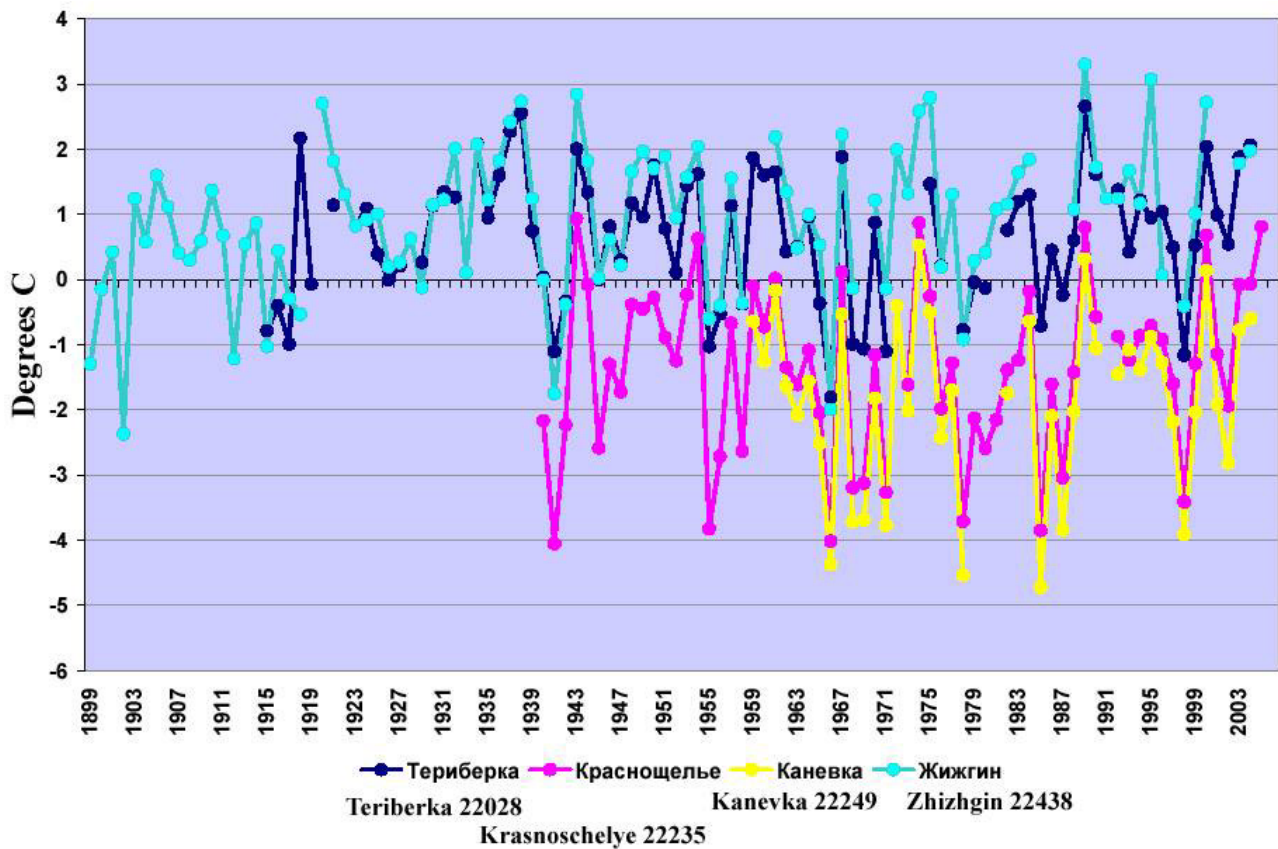
As a result of selection performed by the HadCRUT, 355 Russian weather stations out of 476 available (ie 74,6% of the total) were not used in the calculations of global temperature. Out of the 152 grid cells, 62 cells (40,8% of the total) were excluded together with 143 active weather stations (30% of the total) acting in these cells. In some of these discarded cells there is more than one weather station, up to eight stations in a cell.

Table 2. The distribution of stations over all cells and over the unused cells.

Number of stations in the cell	Total number of cells		Unused cells	
	Number of cells	Total number of stations in these cells	Number of cells	Total number of stations in these cells
1	47	47	30	30
2	30	60	14	28
3	24	72	6	18
4	15	60	3	12
5	12	60	4	20
6	10	60	2	12
7	2	14	1	7
8	9	72	2	16
10	2	20		
11	1	11		
<b>Total</b>	<b>152</b>	<b>476</b>	<b>62</b>	<b>143</b>

It is not easy to find a rational explanation for such a selective approach. But perhaps a working hypothesis can be formulated. When one analyzes the temperature trends from the weather stations located in the cells 65-70° N and 35-40 ° E and not included in the HadCRUT calculations, it is difficult to get rid of the impression that in general they do not show any significant warming trend in second half of the 20 th - early 21 century.

**Figure 2. Temperature series of stations located at 65-70° N, 35-40 °E not included in the HadCRUT calculations of global temperature.**

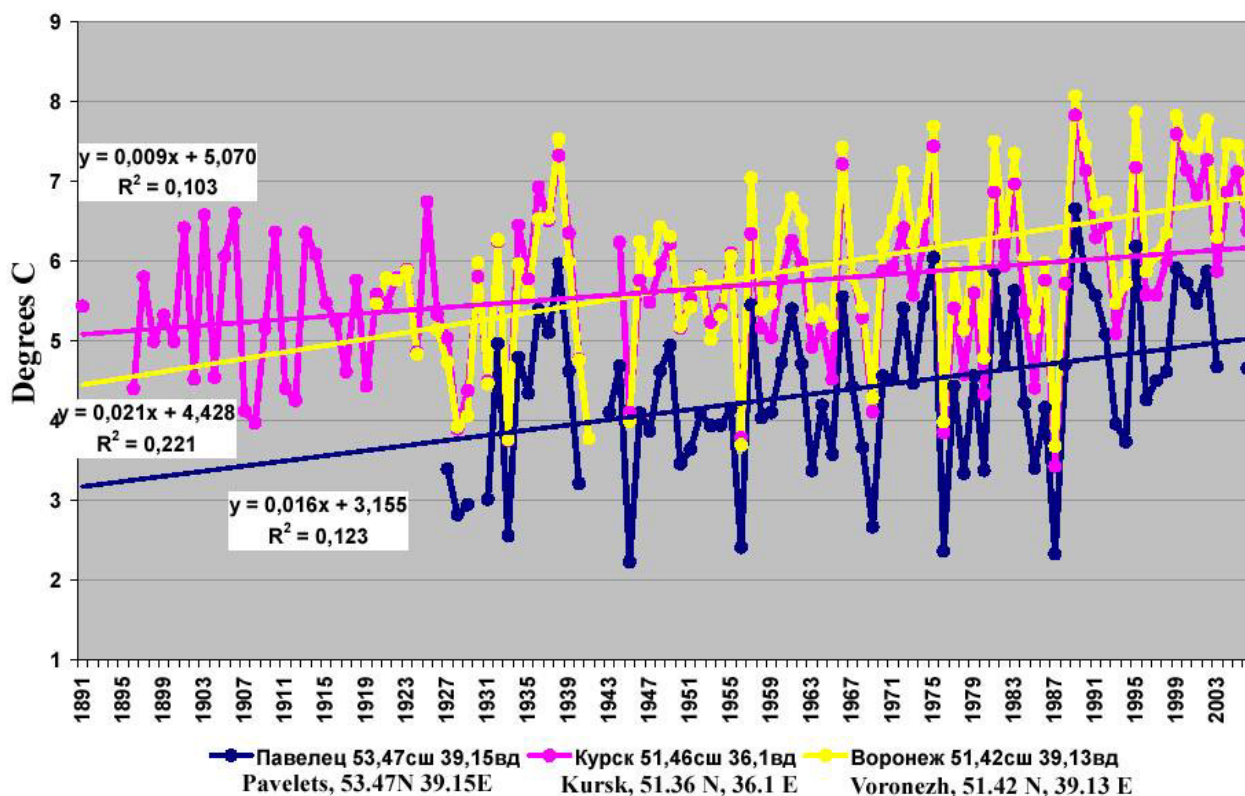


On the other hand, the Hadley Center researchers sometimes used in their calculations data for several or even all stations located within one cell, even when the stations are relatively close to each other.

**Table 3. The distribution of stations over cells used in the HadCRUT calculations.**

Number of stations in the cell	Used cells	
	Number of cells	Total number of stations in these cells
1	64	64
2	22	44
3	3	9
4	1	4
<b>Total</b>	<b>90</b>	<b>121</b>

**Figure 3. Temperature series of weather stations located in the cells 50-55 ° N 35-40 ° E that were included by the HadCRUT in their calculations of global temperature.**



At this moment it does not already seem surprising that all three stations of this cell clearly show the warming trend in the second half of the 20 century.

### 5. Duration of observation period

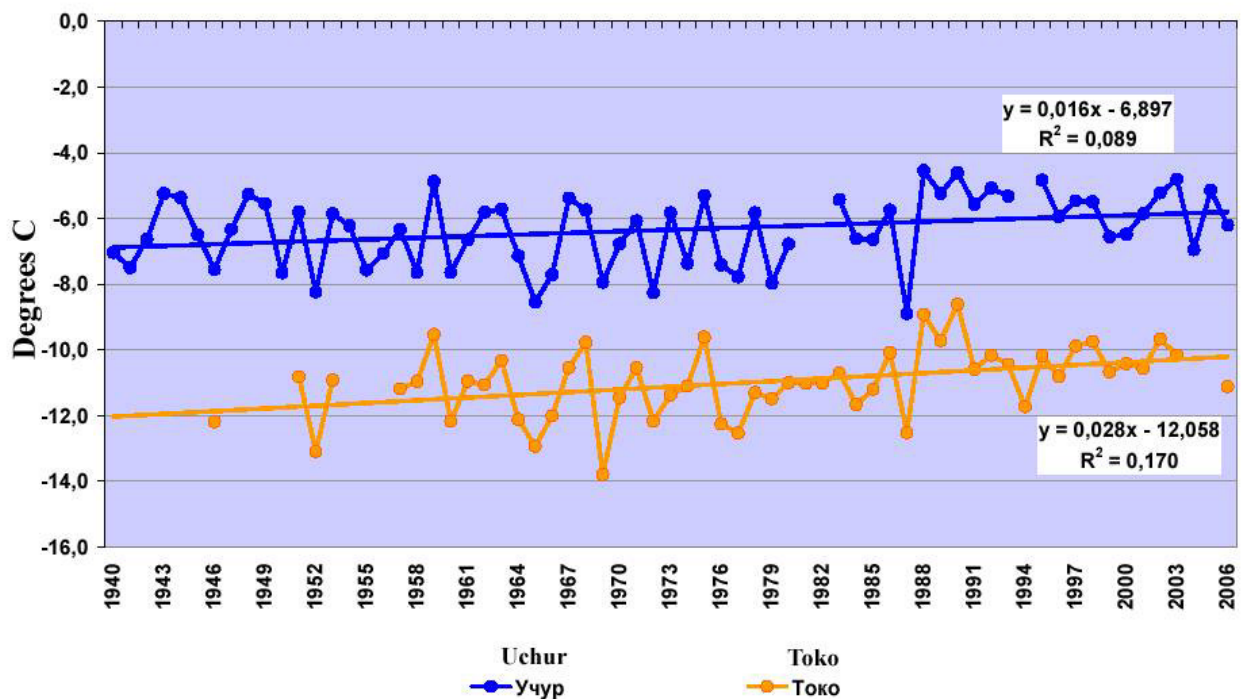
We will check to what extent the Hadley Centre sample conforms to the criteria of ensuring the maximum duration of the observation period.

**Table 4. Distribution of weather stations over the starting year of observations.**

Observations started not later than	Number of stations			Share of stations used in the total number, %
	Total	Used by HadCRUT	Not used	
1850	20	16	4	80,0%
1860	3	2	1	66,7%
1870	7	3	4	42,9%
1880	4	3	1	75,0%
1890	28	16	12	57,1%
1900	20	15	5	75,0%
1910	15	8	7	53,3%
1920	16	9	7	56,3%
1930	32	15	17	46,9%
1940	179	25	154	14,0%
1950	45	8	37	17,8%
1960	69	1	68	1,4%
After 1960	38	0	38	0,0%
<b>Total</b>	<b>476</b>	<b>121</b>	<b>355</b>	<b>25,4%</b>

It would seem that the priority for inclusion in the sample for calculations of global temperature should be given to stations which started meteorological observations in the 19th century, and that namely they should be included in the calculations to the fullest. However, as we see, by far not all the stations with long-term series of observations were included in the calculations. For example, out of 82 stations that started work in the 19th century, 55 stations were included in the calculations, and 27 stations (32.9%) were not. Of the 63 stations where the observations started in the first 30 years of the 20th century, almost half - 31 station - was not included in the sample.

What criterion did the Hadley Center follow in their selection of stations belonging, for example, one and the same cell? Figure 4 shows the temperature trends for the two weather stations - Uchur and Toko, located in one cell with coordinates 55-60 ° N and 130-135 ° E.



The Uchur weather station has a long and almost continuous series of meteorological observations from 1940. The Toko station has an intermittent series of observations from 1946 and is continuous since 1957 only. However, the warming trend in the 20th century was more pronounced in Toko. In their calculations of global temperature the HadCRUT predictably uses data for the Toko station only.

## 6. Maximum completeness (minimum discontinuity) of the temperature series

Hadley Centre researchers point out that they do not make estimates in those cases where the weather data are not available. In this case, it would seem that the preference should be given to the most complete series of measurements. Let's try to assess the existing series by the degree data continuity. To do so, we consider the ratio of the number of actual observations to the number of potential observations (coefficient of the data series completeness).

Coefficient of the data series completeness	Number of stations			Share of stations used in the total number, %	Distribution of the number of stations		
	Total	Used by HadCRUT	Not used		Total	Used by HadCRUT	Not used
Total	476	121	355	25,4%	100,0%	100,0%	100,0%
Over 90	256	59	197	23,0%	53,8%	48,8%	55,5%
80–90	149	38	111	25,5%	31,3%	31,4%	31,3%
70–80	43	14	29	32,6%	9,0%	11,6%	8,2%
60–70	22	7	15	31,8%	4,6%	5,8%	4,2%
50–60	3	1	2	33,3%	0,6%	0,8%	0,6%
Less than 50	3	2	1	66,7%	0,6%	1,7%	0,3%

It turns out that the data not included in the HadCRUT sample and not used to calculate the global temperature are *systematically* much more extensive than the used data. The temperature series with the data series completeness coefficient exceeding 90% are used less than in the quarter of all cases (23%). Instead, the half-empty data series (with completeness coefficient below 50%) are used for two-thirds (66.7%).

Moreover, after Russian data are processed the HadCRUT experts, they sometimes suffer some losses that are difficult to explain. For example, the Hadley Centre has cut the temperature series for the Sortavala station as provided by Roshydromet, see figures 5 and 6.

**Figure 5. Temperature series of weather stations Sortavala and Petrozavodsk as provided by Roshydromet**

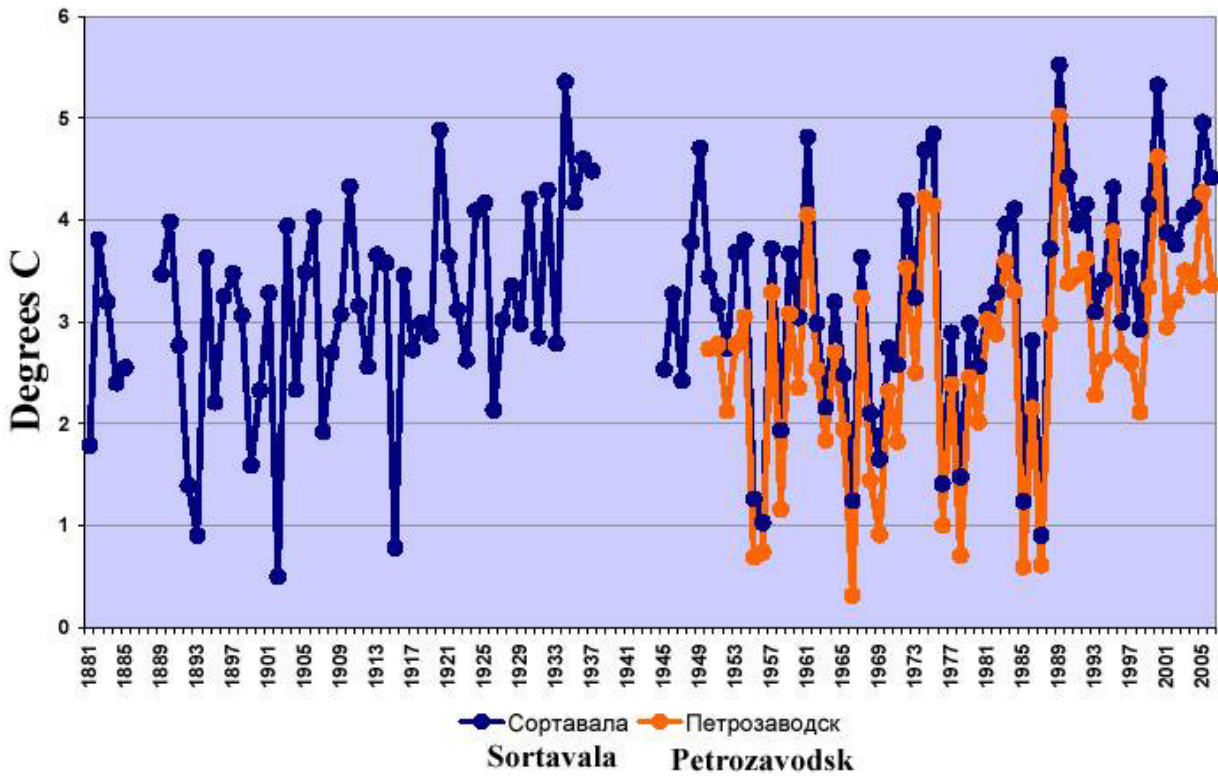
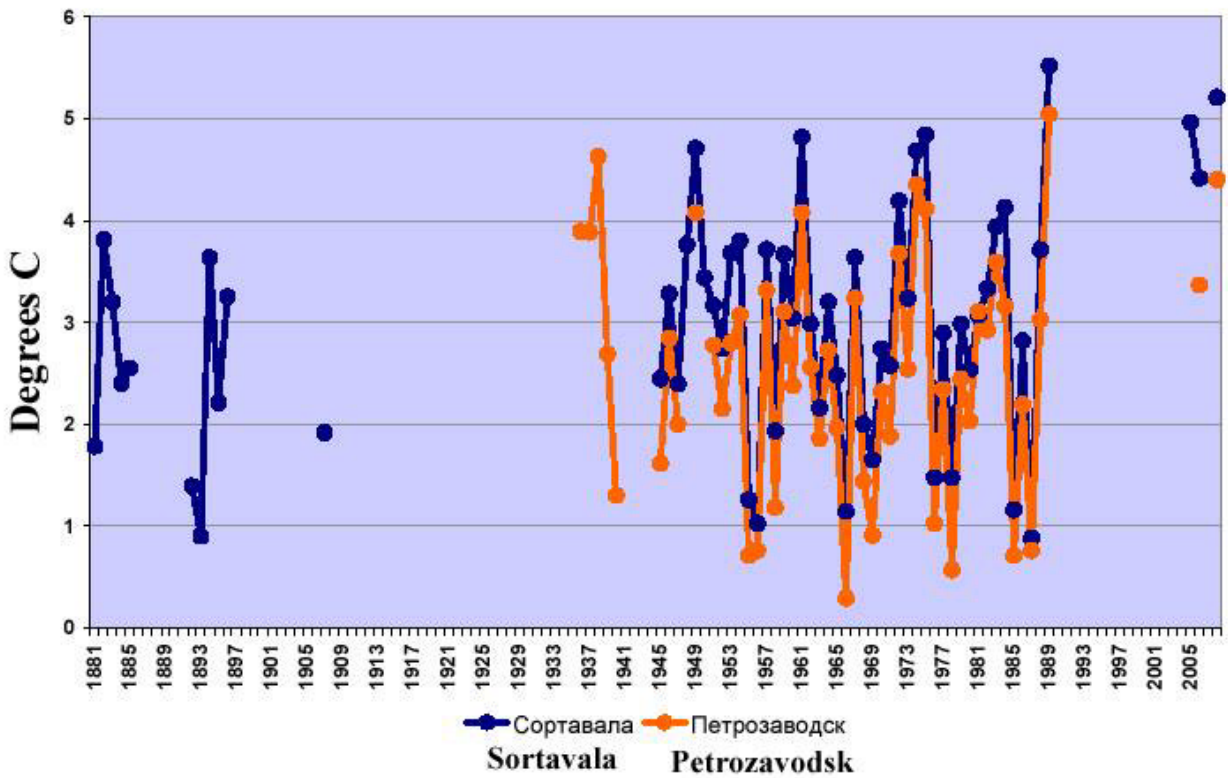


Figure 6. Temperature series of weather stations Sortavala and Petrozavodsk as used by the Hadley Centre



The consequences of this cutting were the removal of data that showed some noticeable warming in Karelia in 1930.

In the result, the longer (positive) temperature trend for Sortavala with a shallower slope was changed to a shorter warming trend with a steeper slope.

### 7. The constancy of the location of meteorological stations (minimum number and minimum distance of their transfers)

To ensure the required quality of the calculations it is important to ensure maximum possible stability of the point of observation. For various causes weather stations can be moved, sometimes by several hundred meters and sometimes by several kilometers. Naturally, the microclimates, including the heating regime, of the new and old locations of the station do not necessarily coincide. Of the 121 Russian stations for used by the HadCRUT, 72 stations (i.e., 59,5% of the total) had been moved during the period of their work, sometimes repeatedly. Among the 355 stations not used by the British experts, only 73 stations (20.6%) had been moved. In other words, the quality of data not used in the calculations of global temperature appears to be much higher than the quality of data used due to the more stable location of the points where observations were taken.

**Table 6. The distribution of stations depending on the stability of their location**

	Number of stations			Share of non-moved stations in the total number, %
	Total	Moved	Not moved	
Used by HadCRUT	121	72	49	40,5%
Not used	355	73	282	79,4%
<b>Total</b>	<b>476</b>	<b>145</b>	<b>331</b>	<b>69,5%</b>

### 8. The effect of urban warming

The effect of urban warming is well known not only to meteorologists: in human settlements the temperature is usually higher than in the surrounding uninhabited areas. In large cities it is usually warmer than in small towns located in the same area. Sometimes the temperature measurements carried out in human settlements appear to be a few degrees higher compared with the nearby countryside. In order to maximally reduce the effect of urban warming,



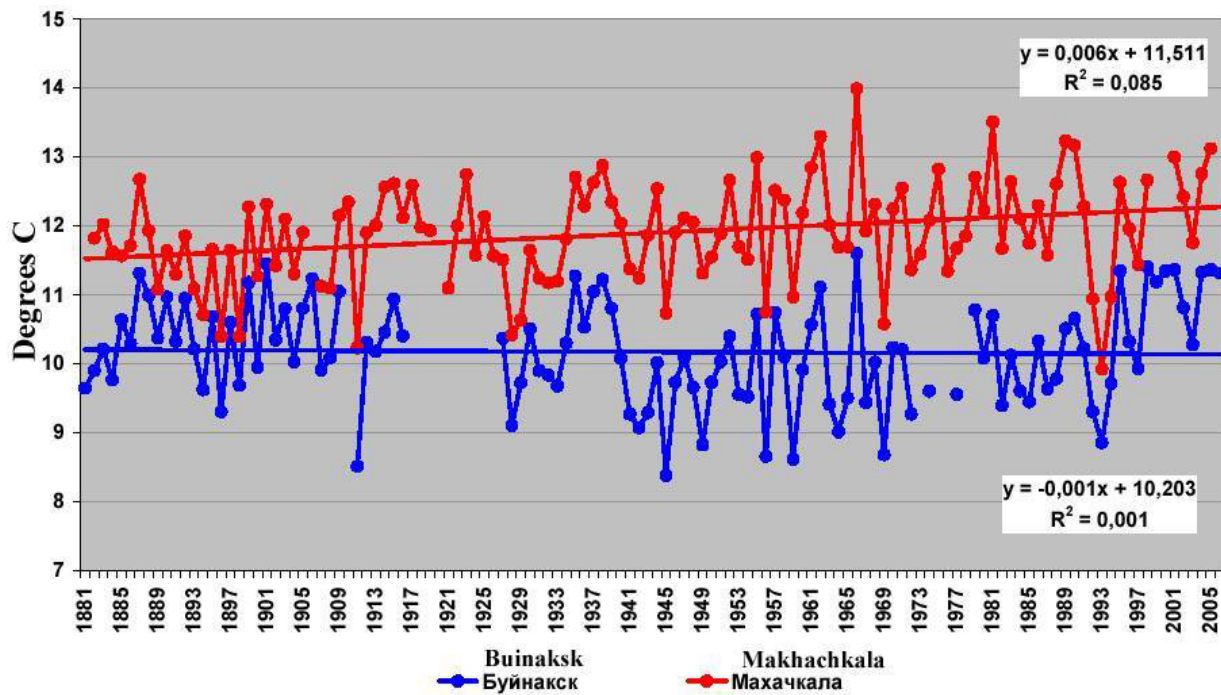
other things being equal, one should give preference to the data received at meteorological stations located in uninhabited or sparsely populated areas.

**Table 6. Distribution of weather stations by type and size of settlement**

Population number	Number of stations			Share of stations used in the total number, %	Distribution of the number of stations		
	Total	Used by HadCRUT	Not used		Total	Used by HadCRUT	Not used
Rural area	314	60	254	19,1%	66,0%	49,6%	71,5%
less than 20 thousand	59	17	42	28,8%	12,4%	14,0%	11,8%
20-50 thousand	39	14	25	35,9%	8,2%	11,6%	7,0%
50-100 thousand	14	3	11	21,4%	2,9%	2,5%	3,1%
100-500 thousand	32	17	15	53,1%	6,7%	14,0%	4,2%
500-1000 thousand	12	5	7	41,7%	2,5%	4,1%	2,0%
over 1000	6	5	1	83,3%	1,3%	4,1%	0,3%
<b>Total</b>	<b>476</b>	<b>121</b>	<b>355</b>	<b>25,4%</b>	<b>100,0%</b>	<b>100,0%</b>	<b>100,0%</b>

About half of the stations for which data were used in the calculations are located in rural areas. However, the proportion of used stations (from the total number of stations in a given category) increases rapidly from 19.1% for stations located in rural areas up to 83.3% for stations located in cities with over million population. It would seem that there is no special need for such a trend -- the potential use of the data from stations located in the countryside is far from being exhausted. In sparsely populated areas there are 254 additional, where the urban warming has no significant effect. The procedure of selecting stations depending on the size of the settlement by the Hadley Centre can be illustrated by Figure 7.

**Figure 7. Temperature series of data of weather stations in Buinaksk and Makhachkala.**



Judging by the formal criteria, among the two nearby weather stations - Buinaksk (42.49 N, 47,07 E) and Makhachkala (42,58 N, 47,33 E), the Makhachkala station looks less preferable. It is located in the capital of Dagestan with more than half a million (552 ths.) people, while the population Buinaksk is only 62 thousand. One should add that the Makhachkala weather station had been moved three times in its history. However, in Makhachkala, from the HadCRUT viewpoint it seems, there is a considerable advantage over Buinaksk - its temperature trend shows warming in the 20th century, while in Buinaksk one observes a weak cooling. Not surprisingly, the HadCRUT calculations of global temperature used precisely Makhachkala and not Buinaksk.

## 9. Results

Analysis of the use by the Hadley Center and Climate Research Unit of the University of East Anglia of meteorological data obtained at the Russian stations shows that their sampling procedure has resulted in the following:

- the share of Russian stations in the global temperature analysis is undervalued compared to the proportion of the land surface area of Russia in global land surface area;
- selection of weather stations was made in such a way that over 40% of the country's territory was not represented in the analysis;

- series with the longest period of observation, that are particularly valuable for assessing the century and a half –long temperature trends, are far from being fully utilized;
- in sampling the data, preference was given to stations with missing measurements, while the more complete series were not used;
- in sampling the data, priority is given to stations that had changed their location compared with the stations with stable locations;
- when having a choice between neighboring stations, the preference is given to stations located in more populated areas, including cities with a distinct "heat spot".

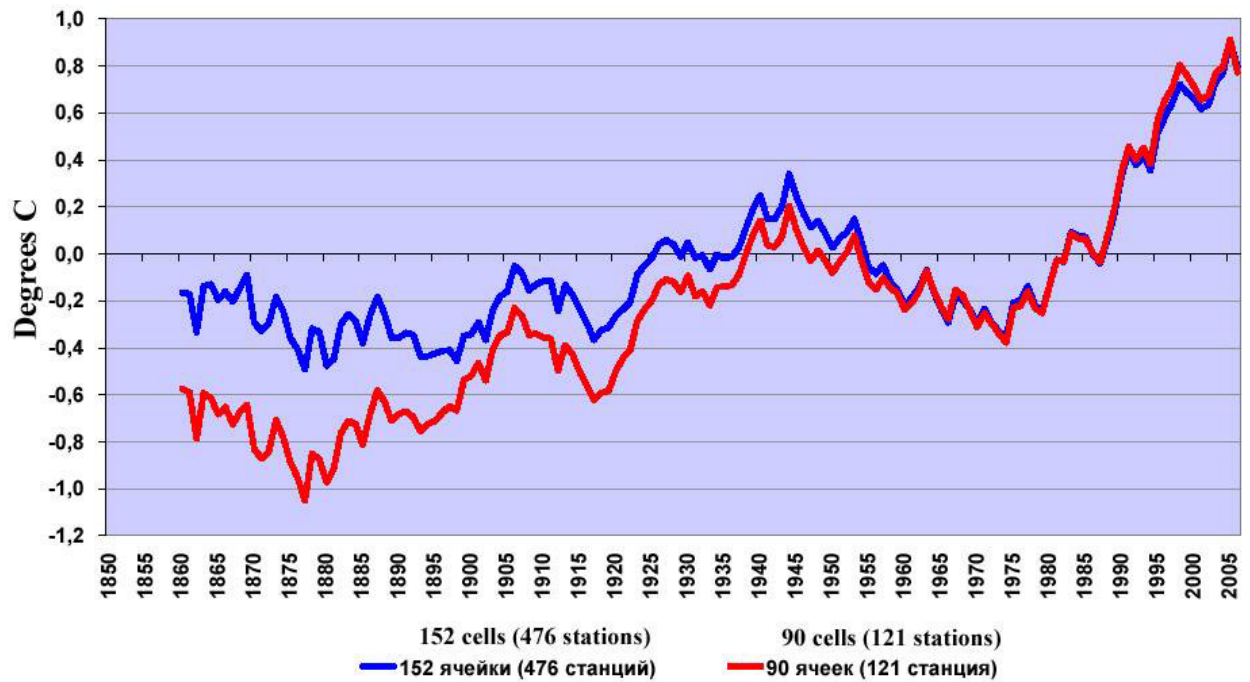
[from this point on, it is Anton's translation: <http://climateaudit.org/2009/12/16/iearussia-hadley-center-probably-tampered-with-russian-climate-data/#comment-209822>]

In other words, the associates of HadCRUT systematically selected the meteorological data, giving preference to lower-quality datasets compared to higher-quality ones; to their [the lower-quality datasets'] shorter and less-complete observation sequences; to the data, collected from stations that were moved around and/or located in areas with higher population density. Besides that, it looks like they [HadCRUT] intentionally discarded the data which characterizes the temperature situation in approximately 40% of our country's area.

In order to test to which extent this [selective-data] approach would affect the final results of the calculations, it is necessary to conduct a comparison of the results based on the [above-mentioned] "narrow selection" to results produced from the analysis of general data.

For analyzing the anomalies of the near-surface air temperature over the territory of Russia compared to the levels of 1961-1990 years (accepted in modern climatology as the baseline), we had conducted an analysis of all 152 cells of the five-coordinate-degree grid (476 stations), as well as of those 90 cells from which the Hadley Center selected the data from 121 stations. In both cases, we averaged all available data for the specific cell, calculated the deviations from the baseline for each specific cell, and calculated the average significance of the deviations for all cells for each year.

**Figure 8: Deviations of temperature in average across the territory of Russia compared to the levels of 1961-1990., 11-year smoothing.**



The results presented in Figure 8, show a significant discrepancy in the evaluations of the two methods. The amount of warming in Russian territory over 130 years – from the 1870’s to the 2000’s, derived from the data used by the Hadley Center (90 cells, 121 stations), comes out close to 2.0 degrees Celsius. However, the calculations based on [all available] datasets (152 cells, 476 stations), show that the amount of warming for the same period was much less – about 1.4 degrees Celsius.

Even if the period of 1955-1995 shows a similar overall pattern of temperature series calculated according to either method – moving farther into the past, as well as into the last decade, there is a quickly growing discrepancy between the two series. Meanwhile, it is obvious that for the time period up to the mid-1950’s, according to the series based on the datasets selected by the Hadley Center, there is a characteristic decrease of the temperature based on the record which includes all 476 stations – but for the time period after 1995, the series based on the selection by Hadley Center, there is a characteristic increase.

In the 2nd half of the 1940’s, the temperature anomalies according to the HadCRUT selection were 0.14 degrees Celsius lower than the results according to the entire [476-station] measurements across the entire Russian territory; in the 1910’s those anomalies were already 0.26 degrees lower, and in the 1870’s – [a deviation of up to] 0.56 degrees Celsius – see Figure 9.

**Figure 9. Difference in temperature anomaly calculations according to the participation of 152 versus 90 grid cells, 11-year smoothing.**



Taking into consideration the negative divergence of the temperature series up to the mid-1950's (up to 0.56 deg.C.) and the positive divergence of the temperature series in the mid-1990's (up to 0.08 deg.C.), the overall artificial increase of the warming, committed by the associated of HadCRUT, for the Russian territory from the 1870's to the 1990's can be described as minimum 0.64 degrees Celsius.

At the same time, this consideration is very conservative, since for the calculations of temperatures across Russia, all data contained in the RosHydroMet database was used – without any selection based on the data's contents, as well as without any necessary corrections, for example, for the effect of cities' temperatures.

Discrepancies of this scale, for a country as large as Russia (12.5 percent of the global landmass), are significant for creating discrepancies in the scale of global warming, presented by HadCRUT and used in the IPCC reports. In order to calculate the scale of such intentional increases, as well as in order to assure the accuracy of the data on global temperature increase, it is necessary to recalculate the entire massif of global temperature data.

If the procedures of processing the climate data, discovered in the scenario of Russia, were also used in respect to the data from other regions of the world, then the unavoidable correction of the calculation of global temperature and its change in the 20th century may turn out to be quite significant.